March 25, 1941. C. P. DEAL 2,236,310

BOBBIN HOIST FOR BOBBIN-HANDLING MACHINES

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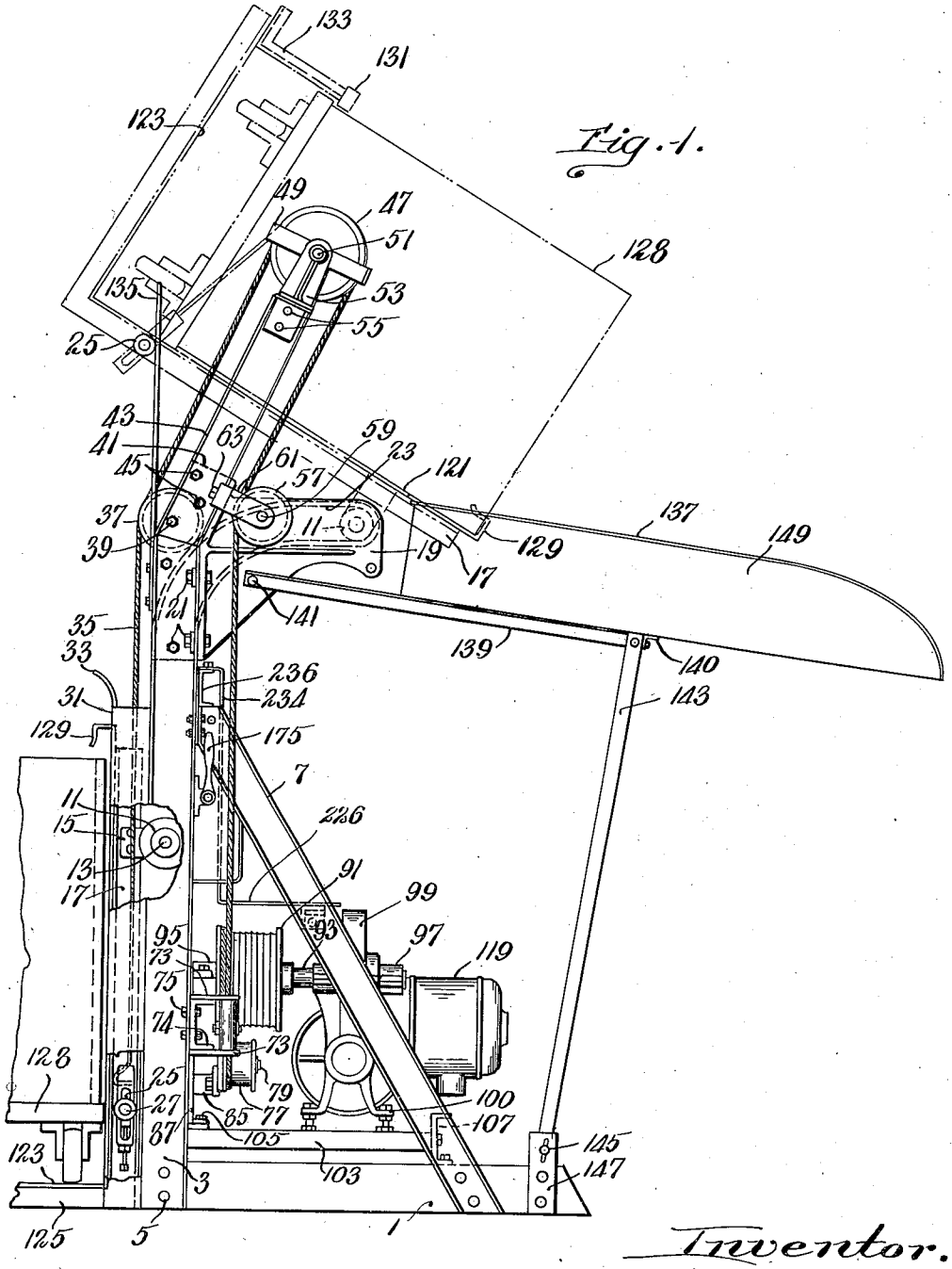


Fig. 1.

Inventor.

Caleb Pinkney Weal,

by Robert K. Randall,

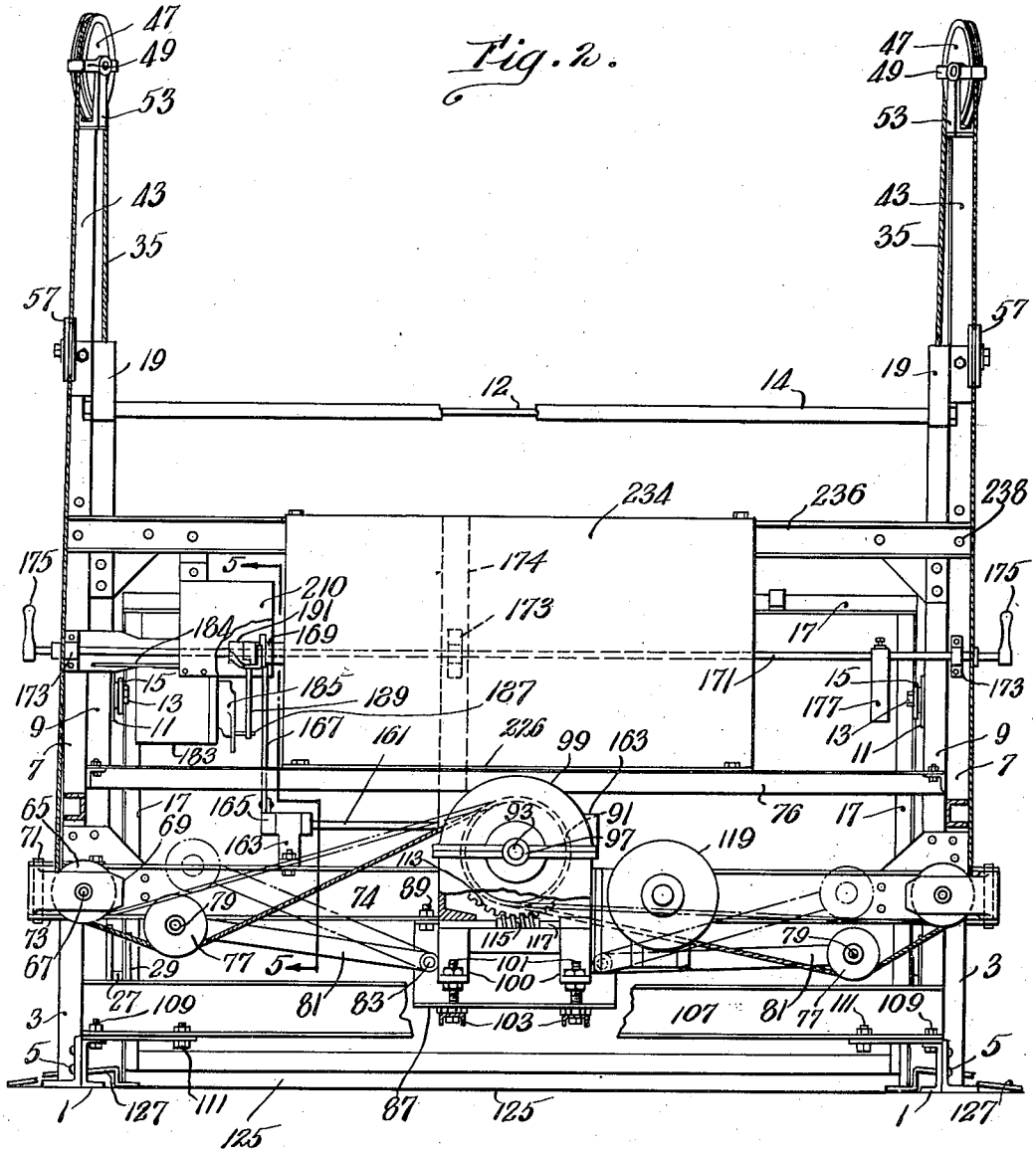
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BOBBIN HOIST FOR BOBBIN-HANDLING MACHINES

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Fig. 2.



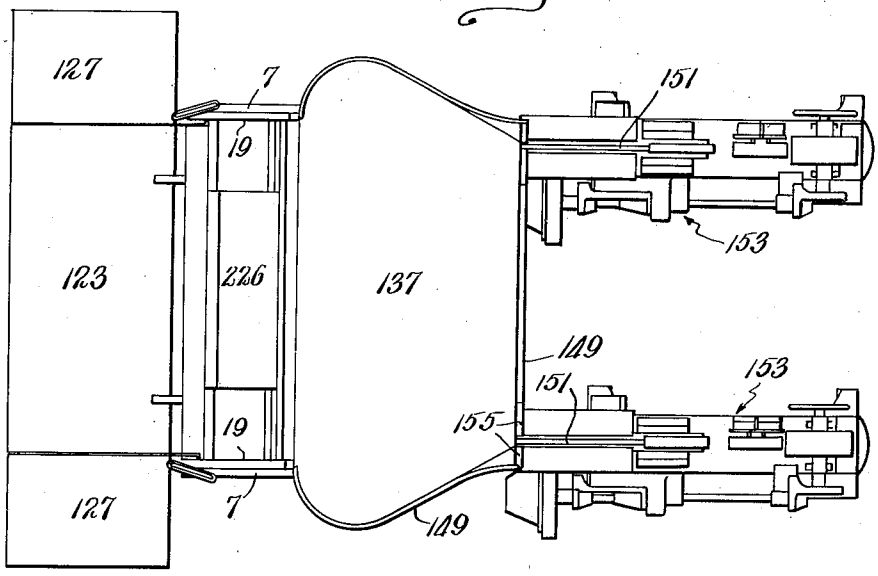
Inventor.
Caleb Pinkney Deal,
by Robert K. Randall
Atty.

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BOBBIN HOIST FOR BOBBIN-HANDLING MACHINES

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Fig. 3.



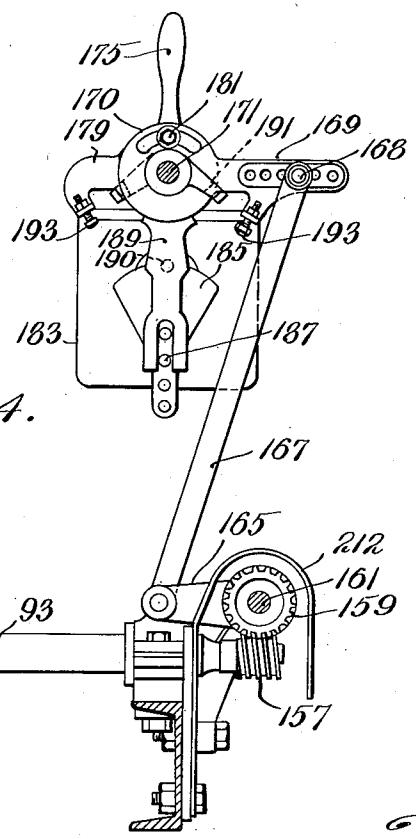
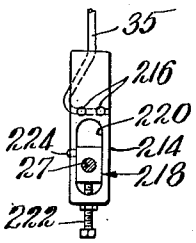


Fig. 4.

Fig. 7.



Inventor.
Caleb Pinkney Deal,
By Robert K. Randall.
Atty

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BOBBIN HOIST FOR BOBBIN-HANDLING MACHINES

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Fig. 5.

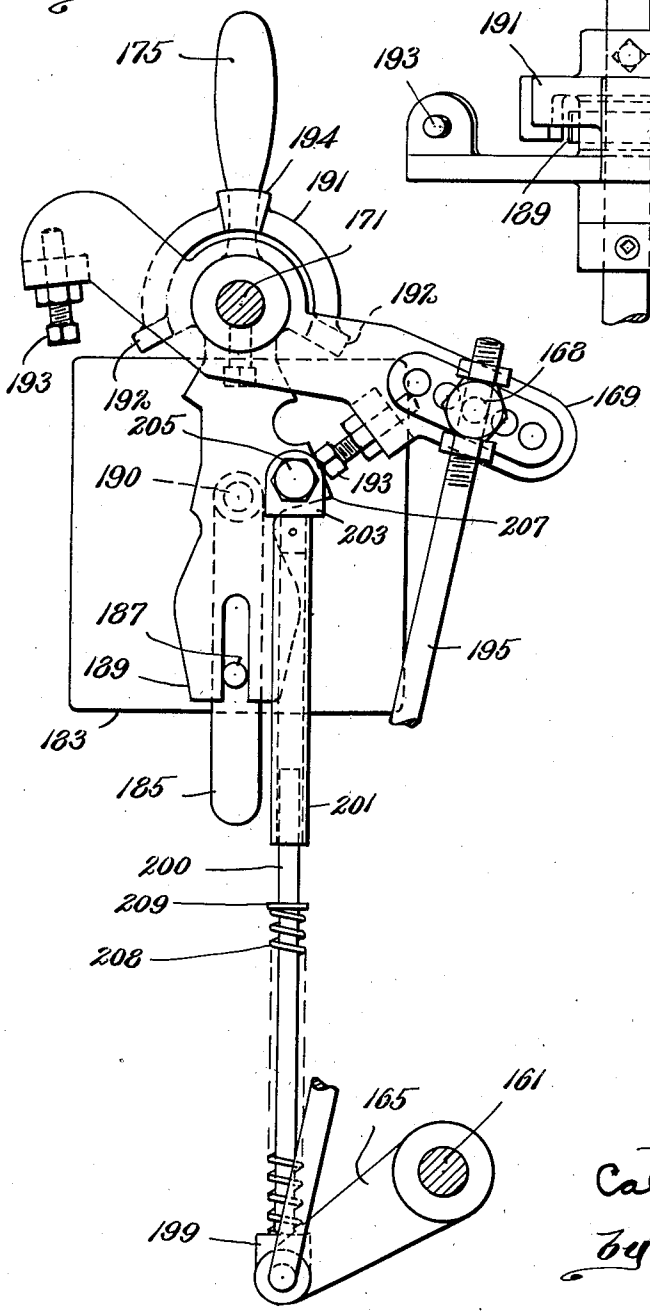
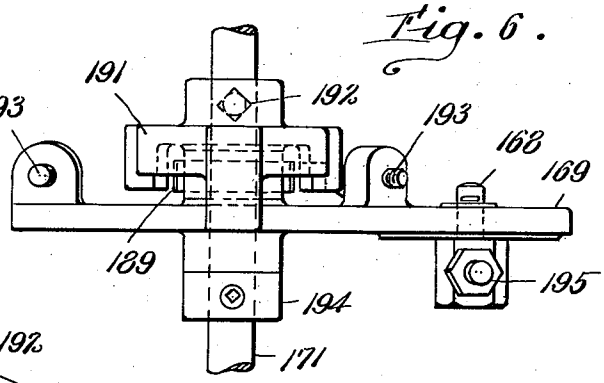


Fig. 6.



Inventor.
Caleb Pinkney Deal,
By Robert K. Randall
Atty.

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BOBBIN HOIST FOR BOBBIN-HANDLING MACHINES

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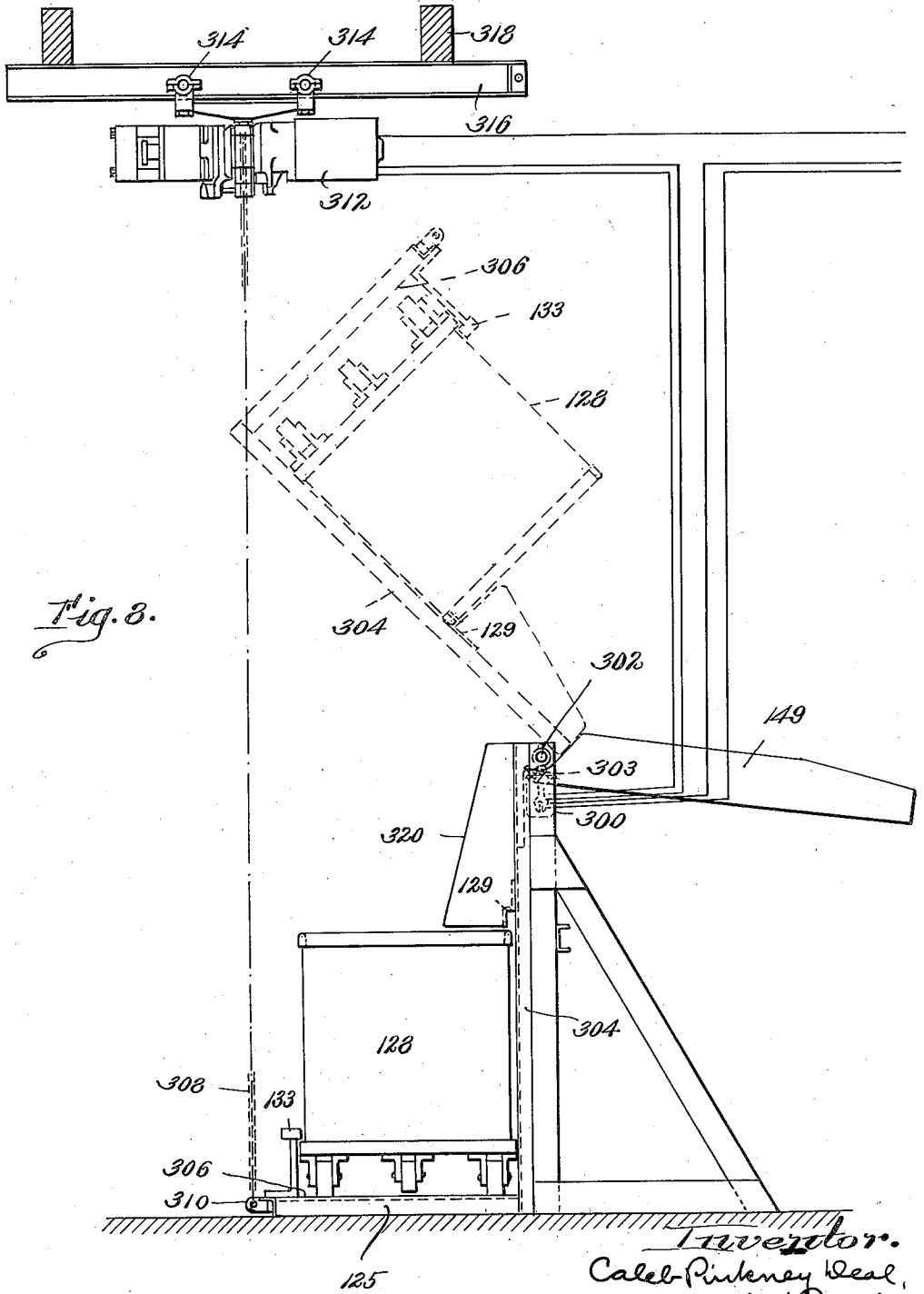


Fig. 8.

Inventor.
Caleb Pinkney Deal,
by Robert K. Randall,
Atty.

March 25, 1941. C. P. DEAL 2,236,310

BOBBIN HOIST FOR BOBBIN-HANDLING MACHINES

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Fig. 12.

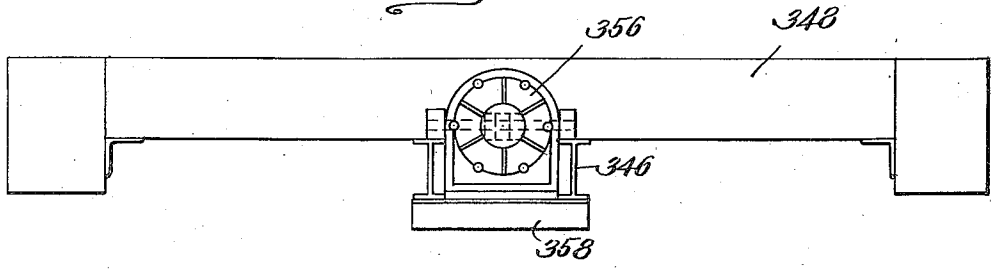


Fig. 9.

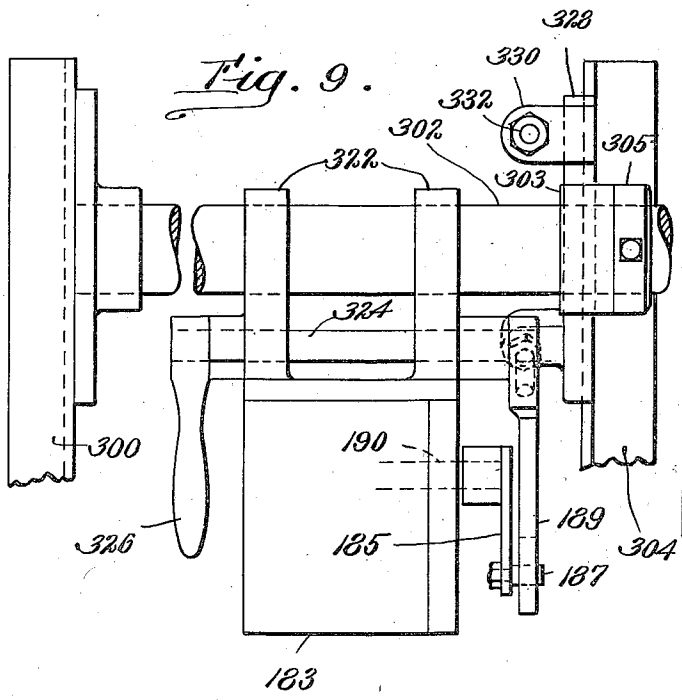
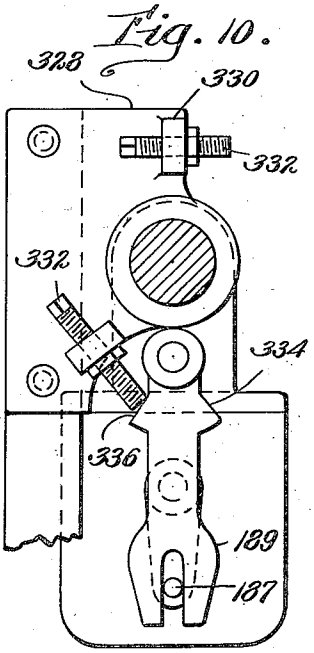


Fig. 10.



Inventor.
Caleb Pinkney Deal,
by Robert K. Randall,
Atty.

March 25, 1941. C. P. DEAL 2,236,310

BOBBIN HOIST FOR BOBBIN-HANDLING MACHINES

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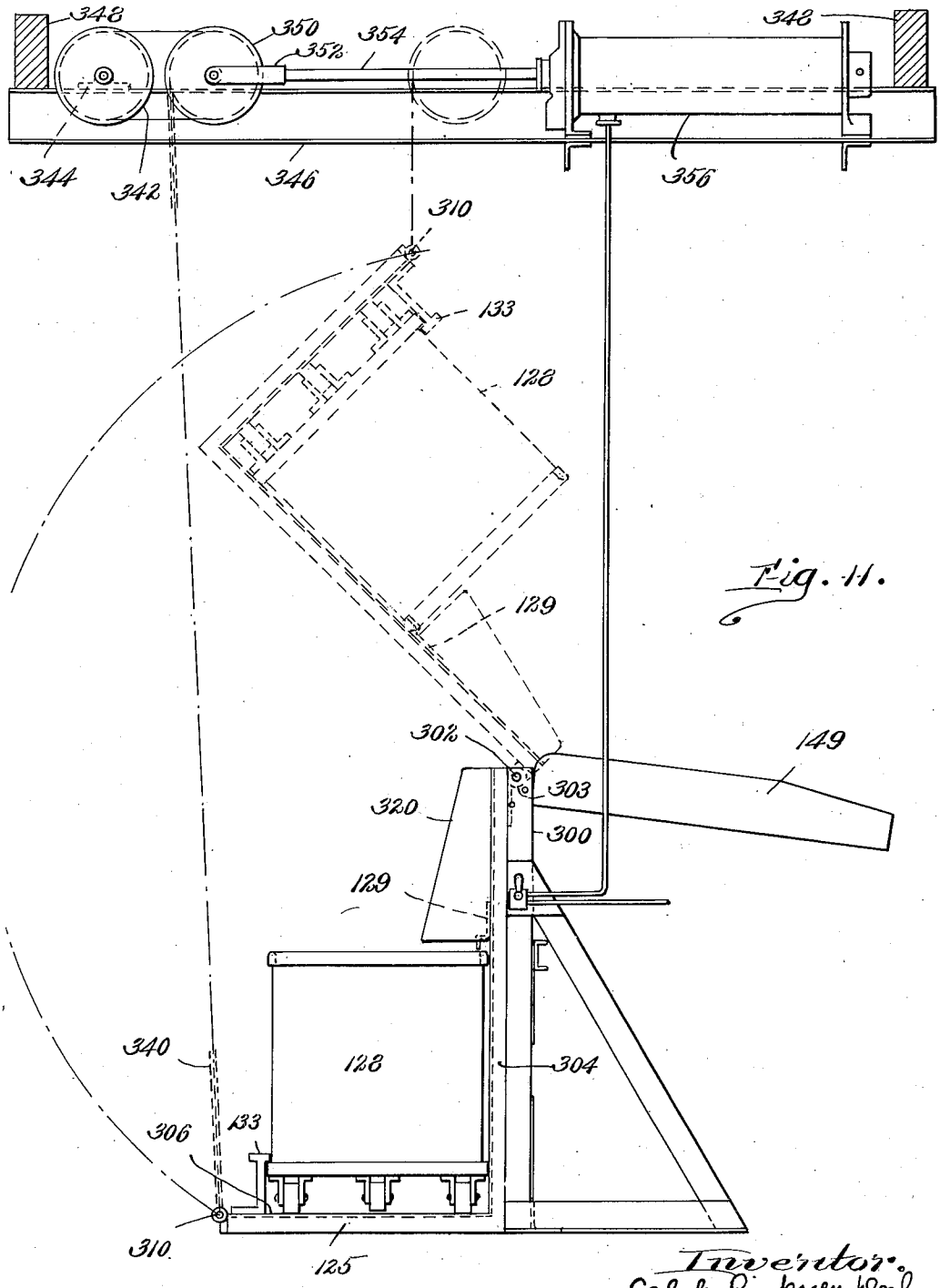


Fig. 11.

Inventor.
Caleb Pinkney Deal,
by Robert K. Randall.
Atty.

Patented Mar. 25, 1941 2,236,310

UNITED STATES PATENT OFFICE

2,236,310

BOBBIN HOIST FOR BOBBIN-HANDLING MACHINES

Caleb Pinkney Deal, Charlotte, N. C., assignor to The Terrell Machine Company, Charlotte, N. C., a corporation of North Carolina

Application June 22, 1937, Serial No. 149,597

8 Claims. (Cl. 214—123)

This invention relates to bobbin-handling machines of various types, and has particular application to the art of mechanically stripping the bunches of waste filling yarn from bobbins purposely discarded from automatic filling-replenishing looms before reaching complete exhaustion.

With the advent of automatic bobbin-stripping machines capable of cleaning the waste filling off of the barrels of from one hundred twenty to one hundred sixty bobbins per minute, the problem of handling the bobbins efficiently has become of nearly as great importance as the actual cleaning. Accordingly, bobbin-stripping machines are customarily mounted at a sufficient height above the floor to permit the standard type of wheeled bobbin-box or car to be run under the machine directly below the discharge point thereof, to catch the stripped bobbins, as a container of substantial capacity must be provided to take care of a relatively large number of cleaned bobbins, in order to save excessive attendance and handling.

The spent bobbins are customarily collected from the looms and brought to the stripping machine, or more commonly to a battery of such machines, in the same type of bobbin-box or car, pushed or rolled along the floor of the mill by the attendant; these cars are of very substantial weight when thus filled with spent bobbins.

If the operator tending each bobbin-stripper is compelled to lift the waste bobbins piecemeal from the bobbin-box by hand, before he can place them in the feeding devices of the bobbin-stripper, which hold not over a score of bobbins at the most, the output of the bobbin-stripper is seriously reduced, as it is seldom possible for the operator thus to keep up with the speed of operation of the bobbin-stripper regardless of its height above the floor and to maintain an output representing above 70% of the full capacity of such machine. Giving this job to a separate attendant likewise has an adverse effect on economy of cost of the stripping operation.

It is therefore an aim of the present invention to provide mechanical means for presenting an unlimited supply of the bobbins to be stripped within easy reach of the operator and as near as possible to the feeding devices of the bobbin-stripper, as well as at the same level as the feeding devices, whereby the waste-carrying bobbins may be gathered from the looms, stripped, and returned to the spinning frames for refilling with a minimum of handling.

To this end, the invention comprises a mechanical hoist as a unitary structure accessory to a bobbin-handling machine, to lift waste-bearing bobbins in large quantities to the level of the feeding devices of such machines. In its preferred embodiment, the inventive concept also contemplates a hoist or elevator capable of taking a loaded bobbin-box or car at floor level, hoisting it well above the level of the feeding devices of the bobbin-stripping machines, and then tipping the box to dump its entire contents at once into a hopper which extends into juxtaposition with the feed-chutes of one or more bobbin-handling machines, the hopper being of unlimited capacity and having a slanting bottom tending to cause the bobbins dumped into it to gravitate into proximity to the said feed-chutes. Preferably, also, means are provided for automatically holding the bobbin-box to the elevator while dumping, and the elevator is operated by power means contrived either to arrest the driving of its own accord after the bobbin-box has reached the top and been dumped, or to reverse its drive automatically after rising and tipping, so as to lower the elevator and box back to floor level and thereupon itself shut off the power.

Through the use of one bobbin hoist embodying the principles of the invention, an unbroken supply of bobbins to be stripped can be kept continuously within easy reach of the operators of a battery of bobbin-stripping machines at or above the level of the feed-chute of each bobbin-stripper, whereby each operator can remain seated on a high stool alongside and facing the feed-chute of his bobbin-stripper to pick the bobbins out of the common hopper and place them in the feed-chute with a minimum of effort and fatigue and at an uninterrupted rate of speed easily equalling the capacity of the bobbin-stripper.

The device of the invention also has utility in other connections where full bobbins, cops, cones, cheeses, packages, and other forms of wound yarn are handled in quantity, as in the case of yarn conditioning machines where the units of wound yarn are to be deposited in bulk on a conveyor for subsequent treatment.

Illustrative embodiments of the invention are shown in the accompanying drawings in which—

Fig. 1 is a side elevation of one form of the improved bobbin hoist, showing in part a bobbin-box in place thereon at floor level, the position of the parts when in dumping relation at the top of the travel of the elevator being indicated in dotted lines.

Fig. 2 is a front elevation of the device of Fig. 1, with the hopper and certain other parts removed and the elevator in lowered position.

Fig. 3 is a plan view of the improved bobbin hoist of Fig. 1, shown in combination with two bobbin-stripping machines to be fed by the hoist.

Fig. 4 is a view of certain of the parts of Figs. 1 and 2, showing the control mechanism for stopping the elevator at either extreme of its travel up or down.

Figs. 5 and 6 are respectively an elevation and a plan view of a device analogous to that of Fig. 4 showing an illustrative arrangement for automatically reversing the travel of the elevator at the top of its course and for bringing it to rest when again at floor level.

Fig. 7 shows the arrangement for adjusting the cable length to keep the elevator platform level.

Fig. 8 is a side elevation of an alternative form of hoist.

Figs. 9 and 10 are front and side elevations of the starting and stopping controls of the device of Fig. 8.

Fig. 11 is a side elevation of the hoist of Fig. 8, as operated by compressed air.

Fig. 12 is a view at right angles to Fig. 11, showing the method of overhead mounting of the pneumatic cylinder of Fig. 11.

The improved bobbin hoist of Figs. 1 to 7 comprises a movable structure having a framework consisting of two spaced and parallel base-members 1 of U-section each having the lower end of an upright channel-beam 3 bolted thereto in right-angle relation at 5, these parts being braced by a diagonal strut 7 of channel iron bolted at its top and bottom ends respectively to the upright 3 and the base-member 1, and held in spaced and parallel relation by cross girths 74, 76, 107 and 236 of channel iron. To the opposed or inward faces of the uprights 3 are bolted additional channel-members 9 which form guides or trackways for flanged rollers 11 rotating on studs 13 fixed in brackets 15 attached to angle irons 17 forming the frame of the elevator car or skip near the top of the single side wall thereof.

Each trackway thus formed by the channel-members 9 is curved around so that its upper extremity has a horizontal extent which carries the flanged roller 11 and hence the top of the single side wall of the skip well out of the line of uprights 3 and out of the path of vertical travel of the skip as a whole. This is attained by means of a bracket 19, bolted to each upright 3 by means of bolts 21 and appropriate webs formed at right angles on such bracket, the bracket having formed on its inward face a channel 23 matching in width the width of the channel in trackway 9 with its quadrant curve tangent to the channel in such trackway 9 and terminating in a short horizontal straight section, the end of the trackway in such horizontal terminal section being closed by a flange to stop the roller 11 from passing beyond the end thereof.

The ends of the two brackets are connected by a tie-rod 12 and spacer 14.

A second guide-roller 25 is rotatably mounted on a stud 27 fixed in a bracket 29 applied to the upright angle irons 17 of the side wall of the skip at each end of such wall. This guide-roller travels up and down with the skip in a guide 31 of U-section, bolted to one flange of each upright channel-beam 3 so that its channel faces inwardly of the machine. The roller 25 passes clear out of the top of guide 31 at the top of the skip's travel, to provide for the swing of the skip about the common axis of rollers 11 after the latter have come to rest against the flanges at the ends of channels 23 in brackets 19, during the tipping of the skip, and therefore the upper end of guide 31 is flared outwardly as indicated at 33 to ensure reentry of roller 25 thereinto on the way down.

The elevator or skip is lifted, tipped, and lowered by means of two steel cables 35 exerting a lifting force on the studs 27 near the bottom of the vertical side wall of the skip. These cables each pass over a pulley 37 rotatably mounted on a shouldered and threaded stud 39 fixed in an angularly extending web 41 at the upper end of each bracket 19, such stud also passing through an obliquely disposed portion 43 of channel-beam similar to upright frame member 3 and forming an angularly disposed extension thereof inclined away from the skip. This extension is also secured to web 41 of bracket 19 by bolts 45. Each cable also passes around an obliquely-set pulley 47, with guard 49, the pulley being pivoted at 51 in a bracket 53 bolted at 55 to the top of the oblique extension 43, and thence downwardly over a pulley 57 pivoted at 59 in a bracket 61 bolted to one flange of extension 43 by bolt 63 which also passes through a web on bracket 19. The cable then descends at each end of the hoist and passes around a swinging pulley 65 pivoted at 67 in a yoke 69 swinging on a pin 71 fixed in brackets 73 attached to the top and bottom flanges of a channel-beam cross-member 74 extending from one upright 3 to the other and attached to each by bolts 75, and thence the cable passes under a heavy broadfaced flanged idler pulley 77 rotating on stud 79 in the end of a swinging arm 81 pivoted at 83 on a stud fixed in a bracket 85 bolted to the bottom of the channel of a short section of channel iron 87 hung from the lower flange of cross-member 74 by bolts 89. Thereafter each cable is attached to and winds around a grooved and flanged winding drum 91 fixed on a shaft 93 journalled in a bearing 95 on the top flange of cross-member 74 at mid-length of the latter, and in bearings 97 in connection with a gear-case 99 which is supported on legs 100 fastened in spaced relation by bolts 101 to spaced inverted channel irons 103 bolted at 105 to the short section of channel iron 87, nuts being provided on bolts 101 immediately above the channel irons 103, and the inner ends of channel irons 103 having spacers between the bottom flange of channel-beam 87 and the channel irons, held in place by bolts 105. The outer ends of channel irons 103 are attached to the middle section of channel-iron-girth 107, which latter is secured by bolts 109 to the top flange of base-members 1 and at 111 to a triangular corner-brace plate interposed between the members.

On drumshaft 93 within the gear-case 99 is fixed a worm-wheel 113 engaged by a worm 115 fixed on worm-shaft 117 which latter in turn is driven by a worm-gear (not shown) fixed on the worm-shaft meshing with a worm (not shown) on the armature shaft of electric motor 119, the latter being mounted by means of its own gear-case upon the side of gear-case 99. The function of the floating idler rolls 77 is to take up the slack in the cables so as to keep them from jumping their pulleys or the grooves on the winding drum, when the winding drum pays off a greater length of cable than is needed to permit the skip to reach floor level.

The skip or elevator car comprises both a vertical side wall 121 formed by affixing a sheet of suitable material to the plane outward faces of angle iron frame-members 17, and a hoisting platform 123 formed by securing a sheet of metal or other suitable material to the top surfaces of angle irons 125 outlining the platform and forming the frame therefor and welded or otherwise rigidly secured in right-angle relation with frame-member 17 of the vertical side of the skip. To facilitate running the wheeled bobbin-box from the floor onto the platform 123 of the skip, either sheet metal ramps 127 (shown broken) may be provided at both ends of the platform with their raised extremities at substantially the same height above the floor as that of the platform when the bottom edges of angle irons 125 rest on the floor, or appropriate recesses may be made in the floor to receive the downturned flanges of such angle irons, so that the sheet metal platform will sink flush with the surface of the floor.

As the motor 119 is operated to wind the cables onto drum 91, the skip carrying a wheeled bobbin-box 128 full of waste-carrying bobbins is lifted in vertical relation until the upper rollers 11 travel around the quadrant and come to rest against the flange terminating this trackway. Continued movement of the cables in the same direction swings the point of attachment of such cables at studs 27 in a curved path about the common axis of the two upper rollers 11 while they thus stand stationary, and the entire skip with its burden of the loaded bobbin-box swings about such axis, the top of the side wall 121 of the skip now swinging downward and the platform 123 of the skip continuing to travel upwardly. The side wall of the skip now supports the bobbin-box, and to prevent the latter from sliding off of such side wall and to keep the wheels of the bobbin-box against or in close proximity to the platform 123, one or more stops 129 are provided at or near the top edge of such side wall to overhang the proximate rim of the bobbin-box as the latter settles against such side wall and to block the sliding of the box during the dumping operation. The distance of these stops from the platform 123 is made adjustable to suit different heights of bobbin-boxes. To help position the bobbin-box correctly on the platform, as well as to help hold its wheels in proximity thereto and to prevent it from becoming overbalanced through the dumping, a guard-rail 131 is provided on the platform, spaced away from the vertical side wall by slightly more than the width of the bobbin-box, and elevated on brackets 133 sufficiently to engage over the shoulder of the reenforce provided around the bottom of the bobbin-box. Also, straight strips of metal 135 of substantial rigidity are bolted to the upper extremities of the flanges of upright channel-beams 3 that are toward the skip, extending vertically to about the elevation of the top ends of oblique channel-members 43, to engage the lower guide-rollers 25 as the skip reaches the limit of its tipping movement to prevent the skip from becoming overbalanced. In the tipping movement, the cables leave the grooves of pulleys 37, returning thereto as the skip returns downwardly.

A large flat bottomed hopper or tray 137 is provided to receive the entire mass of bobbins which is dumped simultaneously out of the bobbin-box by the tipping movement just described. This hopper is supported so that its bottom has a moderate slant away from the hoist, on angle irons 139 attached to brackets 19 at 141, these angle irons being in turn joined to a transverse angle iron 140 and supported by other angle irons 143 attached at 145 to brackets 147 on the base-members 1 with capacity for adjustment at 145 to vary the slope of the hopper bottom so that the delivery end of the hopper will stand at the height of the bobbin-chutes, and also so that the bobbins will tend to gravitate toward the lower end of the hopper.

The entire circuit of the hopper is enclosed by a rim 149 of liberal height, which is depressed at points beneath the tipped-over skip, and also interrupted at the lower edge of the hopper at points exactly in register with the feed-chutes 151, Fig. 3, of the bobbin-stripping machines 153 which are ranked in the desired number across the lower end of the hopper in spaced and parallel relation, flanges 155 matching the slope of the chute sides being provided on the hopper to overlap and enter the feed-chute of each machine to prevent escape of the bobbins between the hopper and the respective feed-chutes as the operator picks or slides the bobbins from the hopper and guides them into the feed-chute.

The control means for the hoist may be arranged either to lift the skip and bobbin-box, dump the contents of the latter into the hopper and then stop, or to perform this operation and thereafter automatically return to floor level and then stop. The mechanism governing the first of these different methods of operation is shown in Fig. 2 and in detail in Fig. 4, in which latter the parts are shown in the position they would assume after the skip had been stopped half way up or half way down, by manual operation of handle 175. It comprises a worm 157 on the end of shaft 93 of the winding drum, engaging with a worm-gear 159 on a rockshaft 161 supported in bearings 163 fixed on the top flange of cross-member 74. One end of this rockshaft 161 has an arm 165 fixed thereon, the free end of which is connected by link 167 with a knock-off lever 169 rotatably mounted on a switch-controlling rod 171 extending across the width of the hoist and rotatably mounted in a bearing 173 on each upright channel-beam 3 and also on the intermediate upright brace 174. This switch-controlling rod 171 is equipped with a starting handle 175 at each side of the hoist, and a gravitating weight 177 tending to bring the rod back to a given angular position when rocked in either direction therefrom. A knock-off dog 179 is also rotatably mounted by means of its hub on the switch-controlling rod 171, and the hubs of this dog and of the knock-off lever 169 are fixed in angularly adjustable relation to each other by clamp screw 181, sliding along a slot in a flange 170, formed on knock-off lever 169.

Within a switch-box 183, supported on bracket 184 attached to uprights 3, is located an electrical reversing switch (not shown) of known and standard construction, having a control arm 185 outside the box which throws the switch to run the motor 119 in opposite directions when such arm is alternately turned in opposite directions about the axis of its horizontal shaft 190 protruding from within the switch-box and on which this arm is fixed. This arm has a pin 187 extending horizontally from its lower portion, which pin is held in the slot of a forked lever 189 loose on the switch-controlling rod 171, so that when the forked lever 189 is swung in either direction the switch-control arm 185 will be rotated in the appropriate direction to throw the switch and

drive the motor in the direction to raise or lower the skip as the case may be.

Manual control of the starting, stopping and reversing of motor 81 and thus of the movement of the skip in either direction is accomplished through a dog 191 fixed on the switch-control rod 171 and having radial fingers 192 spaced about 90° apart which strike the respective sides of lever 189 to throw the switch in either direction when the rod 171 is rocked.

To stop the skip automatically at either end of its travel, the knock-off lever 169 and the knock-off dog 179 are each equipped with a stop-screw 193 threaded into a lug formed on these respective parts, the stop-screws being maintained in adjusted position by lock-nuts, the heads of these screws being adapted to strike respective opposing shoulders of forked lever 189 to throw the switch out of engagement to gravitate back into its illustrated neutral or off position, stopping the lifting or lowering of the skip, as a result of movement of these knock-off parts derived through the worm and gear, link, and intermediate arm from the rotation of the winding drum for the cables, and therefore from the resulting movement of the skip.

With the stop-screws 193 properly adjusted, the switch cannot be thrown in the wrong direction by hand at or near either the top or bottom stopping-point of the skip, so as to tend to cause the driving of the motor to lift the skip beyond the limits of its intended upward travel, or needless paying-out of the cables when the skip is down, because that one of the two stop-screws which moves the forked lever 189 into stopping position remains in position to block the movement of such lever 189 back far enough into the position from which it has just come to run the motor the wrong way. The stop-screw on the opposite side of switch-control arm 185, however, has of course been moved away from such arm, so that free manual operation of this arm and hence of the switch is permitted in the proper direction. Fig. 5 illustrates how this is attained, and also illustrates the provision of a lug 194 on dog 191 to engage whichever arm of lever 169 may be lifted, to prevent manual holding of the switch on the wrong contact, and thus prevents running the motor the wrong way, or arcing at the contacts.

A rough adjustment of the distance traveled by the skip in either direction is attained by shifting the point of pivotal attachment of link 167 to knock-off arm 169, inward or outward along the arm by means of the series of holes provided in the latter for the reception of the pin 168 which connects these two parts together; the longer the effective length of the arm, the more slowly the arm will be turned about the axis of rod 171, and hence the farther the skip will travel up and down its trackways before the motor is shut off. In conjunction with this adjustment, a change in the angular relation between this arm 169 and the knock-off dog 179, maintained by screw 181, assists in roughly determining the stopping point of upward travel of the platform on which the wheels of the bobbin-box rest. The close adjustment of the stopping points at either extreme of travel of the skip is obtained by screwing in or out the screws 193 which make contact with the forked lever 189 to throw it back to off position from either of its power-transmitting positions at one side or other of the center line.

The mechanism for automatic return of the skip and bobbin-box back to floor level is shown in Figs. 5 and 6, the parts being in the position assumed when the skip is down. In this alternative form of the mechanism shown in Fig. 4, after the operator has rocked the starting lever to start the hoisting of the skip and loaded bobbin-box thereon, the skip rises, tips over to empty the contents of the bobbin-box into the hopper, and then automatically rights itself and the bobbin-box, and descends to stop of itself when it reaches floor level. This is accomplished by means of a spring-pressed link biasing the forked lever 189 as the skip rises so that this lever when brought into the vertical center line through its pintle, rod 171, will tend always to swing on past (counter-clockwise in Fig. 5) into the position where it shifts the switch to run the motor in the direction to lower the skip; however, this pressure is not applied until the skip approaches the top of its travel. When the parts are set by hand through handle 175 to throw the switch into lifting position, the switch-control arm and the forked lever will stay there until the stop-screw on the knock-off dog 179 pushes the forked lever and switch-control arm back to the center line position which normally shuts off the power, from which position, as just noted, the biasing pressure carries the forked arm instantly to the extreme of its travel past such center line, reversing the motor and thus righting and lowering the skip automatically from the highest point of the latter's travel. For this purpose, a link 195 is used as before, but is made of round stock, with its lower end bent at right angles and put through the end of arm 165 so that its protruding extremity serves as a journal for a bracket 199 in which is fixed a rod 200 sliding freely in a sleeve 201 pinned to an end-portion 203 pivoted at 205 to an ear 207 formed on forked lever 189 well to the right side of the line joining the pin 187 with the axis of rod 171 about which the forked lever swings. An expanding coil spring 208 surrounds rod 200, and is equipped at its upper end with a flanged bushing sliding freely on rod 200. Thus when the winding drum winds up the cable and the skip rises, the forked arm 189 having been swung by manual rotation of shaft 171 in the only direction in which motion is possible, i. e., to the left in Fig. 5, the free end of arm 165 rises, compressing spring 208 against the lower end of sleeve 201, this upward pressure having no operative effect on the forked lever until the corresponding descent of the left-hand end of knock-off lever 169 carries the forked lever 189 down in an approach to its vertical motor-stopping position shown in Fig. 5. As soon as the screw 205 passes centers, the upward push snaps the forked arm over into the motor-reversing and skip-lowering position where it remains until the completion of the descent of the skip to floor level causes the right-hand end of knock-off lever 169 to bring the forked lever 189 back to its illustrated neutral or motor-stopping central position. The descent of arm 165 relieves the compression of spring 208, through withdrawal of part of the length of rod 200 from sleeve 201, so that there is no spring-force opposing the return of the forked lever and thus the switch to motor-stopping position, or to resist manual throwing of the switch by handle 175 when next a bobbin-box is to be hoisted and dumped. The other parts of Figs. 5 and 6 are slightly simpler than those shown and described in Fig. 4, the radial fingers of dog 191 act on forked lever 189 instead of directly on switch lever 185, knock-off

lever 169 is in one piece, and the switch-lever 185 is simplified; weight 177 also is omitted. Dog 191 is fixed to shaft 171 by screw 192; a collar 194 is fixed on such shaft beyond the knock-off lever 169.

A guard or roof 210 is built over the switch-actuating parts adjacent the switch-box 183. A similar guard 212 of sheet metal is provided over worm 157 and worm-gear 159.

Adjustment of the effective length of the two hoisting cables, to keep the skip platform 123 level in spite of unequal stretch of the two cables 35, is facilitated by the means shown in Fig. 7. The end of each cable is put through a hole bored obliquely downward in the top of an adjustable hitch-member 214 and out the side thereof, and then put into a transverse bore in such block where it is secured by grub-screws 216. An oblong block 218 is fitted on each stud 27 fixed as described on the ends of side wall 17 of the skip, inside of lower rollers 25, and this block is received in a slot 220 in member 214. An adjusting screw 222 threaded vertically through the bottom of member 214, and equipped with a lock-nut, bears against the block within the slot. As is obvious, manipulation of this screw serves to lift or lower the respective end of the platform with respect to its proper cable; after adjustment, a grub-screw 224 is tightened against the side of the block to hold the latter in place in slot 220.

An elevated platform 226 is provided for the attendant to stand on so that he may reach over the rim of the hopper 137 to level out and distribute the dumped bobbins after the skip and bobbin-box have descended, so that equal supplies of bobbins will be within reach of the several bobbin-stripping machine operators. This platform is made of heavy sheet iron extending as far as desired across the width of the hoist, and a foot or two in width, supported on horizontal angle iron 76 attached to struts 7. Thus the operator can stand between the quadrant brackets 19 in the case of a wide hopper serving four or five bobbin-strippers, to level out the piles of dumped bobbins. A sheet metal apron 234 extending vertically from the platform to the top of girth 236 fixed to the upright channel irons of the frame at 238 several feet above the platform, guards the attendant against missteps; as shown, such apron is a continuation of the sheet iron platform 226.

The other forms of the invention shown in Figs. 8 to 12 have special advantages in certain locations and for special uses, as where the hoist can be permanently installed, or where a less height is desired for the upright portions of the hoist itself, or the required height of lift is not so great.

In the form shown in Fig. 8, the uprights of the framework stop at the level of the hopper 149, the frame being preferably permanently fixed to the floor. The framework is similar to but greatly simplified from that shown in the form illustrated in Fig. 1, requiring the provision only of properly spaced and braced uprights 300, in the upper extremity of which is fixed a heavy transverse shaft 302. On this shaft, preferably intermediate two of the uprights 300, and located by collars 305, Fig. 9, is swung by suitable bearings 303 a skip of L-shape in side elevation, comprising a normally vertical wall 304 and a normally horizontal platform 306 in fixed right-angle relation thereto at the bottom extremity of the wall 304. The structure of the wall and platform may be as preferred, or as described in connection with the embodiment of Fig. 1. A chain or cable 308 is attached to an eye 310 located at midlength of the edge of the platform 306 that is away from the vertical wall 304, and extends upward to the winding drum of an electric chain hoist 312 of known or preferred type, suspended from rollers 314 rolling on the inside of the flanges of an I-beam track 316 suspended from the girders 318 of the floor above. When the electric motor of the chain hoist is energized, the chain is drawn upward and wound on the winding drum, swinging the skip about the axis of shaft 302 into the position indicated in dotted lines, the chain hoist unit automatically moving back and forth along its tracks on I-beam 316 as needed to keep the line of lift vertical.

As is obvious, a bobbin car or truck 128 is wheeled onto the platform 306 substantially at floor level, by means of the described ramps 125, and is held from gravitating off of the inverted skip by a hook or hooks 129 on the vertical wall of the skip as before. The portion of wall 304 above the rim of the bobbin truck 128 is completely covered with sheet material, which is extended out at right angles to such wall at each end of the wall in the form of wings 320, to form a chute preventing lateral escape of the bobbins and guiding them into the hopper 149 as they are poured from the inverted bobbin box.

The controls for the motor of the electric chain hoist embody in simplified form the same principles employed in the device shown in Fig. 4. The switch box 183 as shown in Figs. 9 and 10 is mounted by means of hangers 322 on the horizontal shaft 302 just outside one of the bearings 303 whereby the skip is swingingly mounted on shaft 302, but between the outer upright 300 and such bearing. In these hangers, just above the switch box, is rotatably mounted a control shaft 324 having a manually operated handle 326 whereby it may be rocked in one direction or the other. On the other end of shaft 324 is fixed the forked lever 189, described in connection with Fig. 4, imparting angular movement through pin 187 to the control arm 185, like that of Fig. 5, rotating the shaft 190 of a reversing switch (not shown) within switch box 183 to drive the overhead motor in one direction or the other respectively to lift or lower the swinging skip.

In this embodiment, the bearing 303 on the end-member of wall 304 is formed with a flange 328 having outwardly extending lugs 330 and stop-screws 332 adjustably fixed therein which alternatively engage the shoulders 334, 336, on the forked lever 189 to push the latter back toward its vertical neutral position at the end of the desired upward or downward travel of the skip in its swinging path about shaft 302, thereby shutting off the power and stopping the travel of the skip at the top of its swing or stopping the paying-out of the cable after the skip has been again lowered to floor level. In this form, the motor must be restarted by hand through handle 326 in order to lower it back to floor level, after it has been automatically shut off by the mechanism just described at the top of its travel.

In the embodiment shown in Figs. 11 and 12, compressed air is substituted for electric power as the motive force in lifting the skip with its load of bobbins occupying the bobbin truck. The bobbin hoist itself is identical with the form of Fig. 8, described. The hoisting chain, cable, or

wire rope **340** is wrapped first around one sheave of a double block **350** rotatably mounted in a yoke **352** on the end of a piston rod **354** attached to a piston working in a compressed air cylinder **356** mounted on angle irons **358** on the I-beams **346** suspended from girders **348** of the floor above. Thence the rope **340** passes around a sheave **342** rotatably mounted in bearings **344** fixed on I-beams **346**, back around the other sheave of the double block **350**, with its end suitably anchored to a fixed part of the building. Suitable manually operable control means are provided to admit the compressed air to the side of the piston which is toward the sheaves, so that double block **350** will be drawn away from the sheave **342**, thus pulling upwardly on the rope **340** as the latter reeves around the sheaves as one thereof travels away from the other, and lifting the skip into the inverted position indicated in dotted lines.

Known load-retaining devices are employed in connection with the pneumatic cylinder **356** to keep the skip lifted until manual operation of the control valve allows the air pressure to escape from the working side of the piston, whereupon the skip is lowered back to floor level.

While I have illustrated and described certain forms in which the invention may be embodied, I am aware that many modifications may be made therein by any person skilled in the art, without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the particular forms shown, or to the details of construction thereof, but what I do claim is:

1. In a bobbin hoist, in combination, a skip to receive and retain a box of bobbins, means guiding the skip during ascent and descent, cables lifting and lowering the skip, a winding drum, an electric motor rotating the drum alternatively in opposite directions to take up and pay out the cables to lift and lower the skip, a reversing switch for the motor, a member on the switch which in one position causes the motor to drive the drum to lift the skip and in another position causes the motor to drive the drum reversely to lower the skip and in an intermediate position stops the motor, and means connected with parts driven by the motor automatically moving the member from skip-lifting to skip-lowering position as the skip reaches the desired limit of upward travel, and from skip-lowering to stopping position as the skip reaches the desired limit of downward travel.

2. In a bobbin hoist, in combination, a skip to receive and retain a box of bobbins, means guiding the skip during ascent and descent, cables lifting and lowering the skip, a winding drum, power means driving the drum alternatively in opposite directions to take up and pay out the cables to lift and lower the skip, and connections between the drum and the power means automatically reversing the direction of rotation of the drum under the drive of the power means at the upper limit of travel of the skip and automatically arresting the driving of the drum as the skip reaches the lower limit of its travel.

3. In a bobbin hoist, in combination, a bobbin car, an elevator for such car, power means lifting and lowering the elevator, tipping over the elevator and subsequently righting it during the course of its rise and fall, means retaining the car on the elevator, and devices automatically controlling the power means to cause the latter to lift, tip, right, and lower the elevator, and thereupon to remain idle.

4. In a bobbin hoist, in combination, a bobbin car, an elevator for such car, power means lifting and lowering the elevator, tipping over the elevator as a single unit and subsequently righting it during the course of its rise and fall, means retaining the car on the elevator, and devices driven by the power means directly and apart from the elevator automatically interrupting the action of the power means after the elevator has been tipped over.

5. A bobbin-feeder for bobbin-handling machines having in combination a hopper in proximity with the feeding devices of a bobbin-handling machine, means supporting such hopper at substantially the height of such feeding devices above floor-level, a car traveling along the floor to and from the bobbin-feeder to collect bobbins to be fed to the bobbin-handling machine, a car-carrying device, power-driven means lifting this device to the hopper, means for tipping the car to empty its contents into the hopper, and means in connection with the car-carrying device serving through relative movement of the car with respect to the car-carrying device to secure the car thereto while tipped.

6. A bobbin-feeder for bobbin-handling machines having in combination a hopper in proximity with the feeding devices of a bobbin-handling machine, means supporting such hopper at substantially the height of such feeding devices above floor-level, a car traveling along the floor to and from the bobbin-feeder to collect bobbins to be fed to the bobbin-handling machine, a platform, power-driven means lifting this platform above the hopper and lowering it again to floor-level, means attaching the car to the platform acting under the force of gravity when the car and platform are tipped, and means tipping the platform and car to empty the latter's contents into the hopper.

7. In a bobbin hoist, in combination, a framework, a skip mounted directly on such framework for upward, downward, and tipping movement as a unit with respect thereto and adapted to receive a separate box containing the bobbins, and means securing the box to the skip through relative gravitational movement of the box with respect to the skip as the box and skip are tipped in unison to empty the box.

8. In a bobbin hoist, in combination, a skip to receive and lift a box of bobbins, power means lifting the skip, means guiding the top and bottom portions of the skip respectively in different paths so as to tip the skip bodily during its upward travel and thus empty the box, and means acting through gravitational movement of the box with respect to the skip as the two are lifted and tipped simultaneously to secure the box to the skip.

CALEB PINKNEY DEAL.